

XI. *Abstract of a meteorological journal kept at Benares during the years 1824, 1825, and 1826. By JAMES PRINSEP, Esq. Assay Master of the mint at Benares. Communicated by PETER MARK ROGET, M.D. Secretary of the Royal Society.*

Read January 25, 1828.

THE three principal Tables, each of which comprises the abstract for one year of the meteorological journal at Benares, are followed by two others, numbered I. and II., presenting the mean daily oscillations of the barometer, and the monthly deviations from its average height, for each month during four successive years, accompanied by the corresponding variations of the thermometer from its mean. These tables exhibit the remarkable coincidence preserved by these phænomena throughout the year. The indications of the barometer are all reduced to the freezing point by DULONG and PETIT's formula for the dilatation of mercury. I have inserted in the first column of Table I. the mean of three years' observations made at Berhampoor by Dr. A. RUSSEL; but the instrument employed being of the mountain construction, the mercury did not move freely in the tube, which will account for the oscillations being uniformly less than those measured by myself. Mr. DANIELL has noticed the liability of barometers to deteriorate from the accumulation of air bubbles above the mercury: to obviate this cause of error, I made frequent comparisons with one of WOLLASTON's boiling thermometers. From October 1823 to August 1825, the error from this cause amounted to .046 inch, and I deemed it necessary to reboil the barometer; it then stood, as nearly as possible, correct once more. All of my tables have been cleared of the minute error thus found.

As a graphic representation more readily enables the eye to estimate the agreement of two lines in motion, I have delineated in a diagram the courses indicated by Table II., only reversing the direction of one curve, that the two lines may be collateral with respect to the centre line which stands for the annual mean. The scales at the sides will explain the formation of the curves. The year 1826 is omitted in the diagram, because the last two months are wanting in the series of observations.

Abstract of a Meteorological Journal : Benares, 1824.

Date.	Barometer.		Thermometer.			Wet Bulb Therm.*		Hair Hygrometer.	Evaporation.	Rain.	Wind.	Weather.
	Obs.	Mean.	Interior.	Exterior.	Extremes.	Mean.	Diff. +0.8					
Jan. . .	9 A.M. 29.892 5½ P.M. 29.807	29.849	59.82 62.35	57.32 63.27	49.68 69.35	56.60	4.49	94.1	1.924	One shower.	W. and Calm.	Foggy : clear : change.
Feb. . .	10½ A.M. 29.786 5½ P.M. 29.688	29.737	66.40 70.12	68.16 67.32	55.40 76.52	61.34	7.20	83.7	3.220		W. and Calm.	Cirrocum. Hard winds.
March	10½ A.M. 29.752 6¼ P.M. 29.650	29.701	75.70 80.22	79.42 83.40	66.30 86.11	67.32	14.89	83.0	6.632	0.240	W.	Several gales.
April	10 A.M. 29.659 6½ P.M. 29.544	29.601	82.85 86.89	85.42 92.38	73.75 95.10	70.84	18.86	80.1	10.697	0.140	W.	Steady weather.
May . .	10 A.M. 29.500 6¾ P.M. 29.385	29.442	88.59 92.05	95.12 99.66	80.97 103.70	74.38	23.81	83.2	13.044	0.400	N.W. E. Var.	Clear : then misty : then gale and violent storm. (Sultan- poor barracks blown down.)
June . .	10¼ A.M. 29.387 6 P.M. 29.274	29.330	89.11 92.46	89.76 89.42	77.11 101.65	84.42	5.97	90.9	8.157	3.015	W. Var. E.	Little rain, but cloudy.
July . .	11 A.M. 29.322 5 P.M. 29.253	29.287	85.65 87.22	85.79 85.95	80.18 90.40	82.65	4.02	96.2	2.785	17.480	E. W. S.W. E.	Settled rain.
August	10 A.M. 29.402 5¼ P.M. 29.344	29.373	81.76 90.33	85.96 85.15	80.60 90.01	83.28	3.07	94.8	2.318	9.152	Calm. E. Var.	Fine towards the 15th.
Sept.	10½ A.M. 29.572 5½ P.M. 29.484	29.528	85.65 88.06	84.90 86.94	77.43 91.33	80.11	6.61	87.6	3.781	2.850	W. Var. E.	Showers : clear : cloudy.
Oct. . .	10½ A.M. 29.712 5½ P.M. 29.627	29.669	81.60 82.93	80.94 81.15	72.28 85.96	78.81	3.03	87.1	2.911	3.125	E. Calm. Var.	A gale from W : then clear : then squally.
Nov. . .	10½ A.M. 29.819 5 P.M. 29.729	29.774	74.36 76.37	72.11 73.78	59.68 78.50	66.89	6.85	81.0	2.925	0.500	Var. Calm.	Cleared up.
Dec. . .	10½ A.M. 29.873 5 P.M. 29.797	29.835	65.56 67.16	62.15 64.49	50.58 68.51	58.19	5.93	82.8	2.005	1.420	W. Var. S.E.	Clear and fine : gale on the 30th.
Annual Mean	.....	29.593	79.71	79.99	77.50	72.07		87.04				

* This thermometer stands 0.8 deg. higher than the others ; this quantity is therefore added to the column of differences.

Date.	Barometer.		Thermometer.				Wet Bulb Therm.		Hair Hygr.		Evapo- ration.	Rain.	Wind.	Weather.	
	Obs.	Mean.	Interior.	Exterior.	Extremes.	Obs ^{ns} .	Mean.	Diff. +0.8.	Obs ^{ns} .	Mean.					
Jan. . . 10 ³ / ₄ A.M. 5 P.M.	29.883 29.797	29.840	64.54 66.15	62.97 64.09	54.12 68.14	61.05 62.06	61.55	2.78	92. 89.	90.5	1.826	Inches. 4.095	Var. E. W. E.	Unseasonable strati- fogs: rain: storms: cumuli.	
Feb. . . 11 A.M. 4 ¹ / ₂ P.M.	29.803 29.732	29.767	67.88 70.02	67.11 72.11	56.98 73.07	63.08 63.70	63.39	7.02	85. 81.	83.0	2.406	5.325	Var. W.	Clear: cirri. Seve- ral heavy storms: then clear.	
March 10 ¹ / ₂ A.M. 5 ¹ / ₂ P.M.	29.785 29.673	29.729	74.53 78.42	74.22 75.96	63.68 84.00	66.00 65.02	65.51	11.38	83. 76.	79.5	4.029	0.335	Var. SE. W.	Dull haze: violent storm: clear.	
April.. 10 A.M. 5 ³ / ₄ P.M.	29.661 29.550	29.605	85.29 86.39	88.05 91.90	75.11 100.20	73.93 71.30	72.61	18.11	79.2 74.	76.6	12.669	0.025	Calm. W. SE. W.	Clear: cirrostrati: hard gale E. Changeable.	
May .. 10 A.M. 6 P.M.	29.595 29.485	29.540	89.10 90.54	93.29 96.14	81.79 105.43	79.31 78.05	78.68	16.88	Broken and replaced by an accurate Hair Hygrometer.		16.864	.....	Var. E. E.	Clear: gale from N.
June .. 10 A.M. 6 ¹ / ₄ P.M.	29.420 29.311	29.365	89.68 90.32	91.30 93.65	85.19 97.93	79.99 80.38	80.18	13.09			7.720	5.725	NE. W. NE. Calm.	Cloudy: hard gale E: showers.	
July .. 10 ³ / ₄ A.M. 6 ¹ / ₄ P.M.	29.404 29.317	29.361	87.03 88.64	85.82 86.91	81.82 89.58	82.29 82.65	82.47	4.69			4.447	11.050	E.	Heavy rain: cloudy.	
August 10 ¹ / ₂ A.M. 6 P.M.	29.518 29.425	29.471	87.68 89.92	86.61 88.50	81.76 90.34	81.30 82.30	81.80	6.55			4.426	4.650	E. SW. E.	Hot and cloudy.	
Sept... 10 ¹ / ₄ A.M. 6 P.M.	29.581 29.468	29.524	85.13 86.79	83.85 85.13	79.95 87.43	80.57 80.29	80.43	4.86	94.1 82.3	88.4	2.657	9.020	Var.	Gale three days: cumuli: cumi- cirri: fair.	
Oct. . . 10 ¹ / ₄ A.M. 5 ¹ / ₂ P.M.	29.702 29.615	29.653	81.13 83.35	80.05 81.69	74.68 84.41	74.74 76.03	75.38	6.29	84.8 81.6	83.2	3.003	6.130	S. Calm. W.	Rain and gale: dry weather: clear.	
Nov. . . 10 ³ / ₄ A.M. 5 ¹ / ₂ P.M.	29.829 29.718	29.773	72.59 75.48	69.84 72.78	62.29 75.63	64.73 65.09	64.91	7.20	80.5 73.2	76.8	3.168	0.550	W. Gentle. W.	Cloudless sky to the 18th: then showers.	
Dec. . . 10 ¹ / ₄ A.M. 5 ¹ / ₂ P.M.	29.868 29.766	29.812	65.15 68.10	61.34 65.80	53.02 68.47	55.45 58.03	56.74	7.63	76.2 73.2	74.7	3.852	.....	W. Regular.	Dry and colder than usual.
Average.....	29.620	80.16	79.96	78.12		71.97								

Abstract of a Meteorological Journal; Benares, 1826.

Date.	Barometer.		Thermometer.				Wet Bulb Therm.			Hair Hygr.		Evapo- ration.	Rain.	Wind.	Weather.
	Obs.	Mean.	Interior.	Exterior.	Extremes.		Obs.	Mean.	Diff. +0.8.	Obs.	Mean.				
Jan. . .	10 $\frac{1}{2}$ A.M. 29.835 5 $\frac{1}{2}$ P.M. 29.740	29.787	64.85 68.91	61.34 66.45	53.57 69.72	61.64	53.60 57.86	55.73	8.9	73.4 69.8	71.6	3.138	Inches. 0.150	W. E. Calm.	Clear and cold; one storm.
Feb. . .	10 $\frac{1}{2}$ A.M. 29.737 5 $\frac{1}{2}$ P.M. 29.641	29.689	71.38 73.38	72.38 72.64	57.81 76.64	67.22	57.89 57.85	57.87	13.0	59.6 52.4	56.0	3.928	....	W. Calm.	Steady: clear.
March	10 $\frac{1}{2}$ A.M. 29.751 5 $\frac{1}{2}$ P.M. 29.645	29.698	77.14 82.65	77.98 83.59	67.91 86.55	77.23	63.75 64.72	64.23	17.3	62.4 54.2	58.1	9.853	0.410	Var. E.&W.	Very dry on 31st.
April..	10 A.M. 29.625 6 P.M. 29.492	29.558	83.85 85.54	87.31 92.52	78.41 98.31	88.36	67.23 68.43	67.83	22.9	61.1 60.5	60.8	16.789	....	W.	Steady hot wind.
May ..	9 $\frac{1}{2}$ A.M. 29.575 6 P.M. 29.438	29.506	88.18 89.87	87.98 93.83	81.84 99.82	90.83	73.45 72.98	73.21	18.9	73.4 66.6	70.0	13.589	0.180	Calm. W. E. Var.	Several storms: eclipsed 21st.
June..	9 $\frac{1}{2}$ A.M. 29.406 6 $\frac{1}{4}$ P.M. 29.304	29.355	88.64 91.18	87.72 89.85	85.66 93.56	89.61	80.40 80.17	80.29	9.2	84.9 79.6	72.2	7.559	1.885	E. Var.	Changeable: one gale.
July ..	9 $\frac{1}{2}$ A.M. 29.325 6 P.M. 29.263	29.294	86.74 87.43	84.42 85.36	80.70 87.64	84.17	81.69 81.55	81.62	4.1	91.6 89.2	90.4	3.980	25.730	Var. E. W.	Heavy rain.
Aug...	10 A.M. 29.470 6 P.M. 29.391	29.431	85.28 86.24	83.99 84.15	80.04 86.35	83.19	81.91 81.64	81.77	3.0	93.0 91.9	92.4	3.314	11.720	Very Var.	Cloudy and showery.
Sept...	10 $\frac{1}{2}$ A.M. 29.549 6 P.M. 29.456	29.502	86.56 87.86	85.22 86.29	79.86 89.01	84.43	80.28 79.59	79.93	6.4	84.8 81.8	83.3	7.010	4.270	E. W.	Set in fine on the 16th.
Oct. . .	10 A.M. 29.757 6 P.M. 29.660	29.708	83.93 86.27	81.19 83.94	73.96 87.18	80.57	72.87 73.03	72.95	10.4	78.3 70.2	74.2	8.000	0.100	W. E. W.	Clear and fine: one squall 14th.

TABLE I. Daily Oscillations.

Month.	Barometer.					Thermometer.				
	3 Years by Dr. RUSSEL.	1824.	1825.	1826.	Mean of 3 last.	1823.	1824.	1825.	1826.	Mean.
January	Inch. .073	Inch. .092	Inch. .091	Inch. .109	.097	21.5°	19.7°	14.0°	16.1°	17.8°
February .....	.098	.109	.096	.103	.103	21.0	21.1	16.1	18.8	19.2
March .....	.098	.117	.124	.122	.121	24.0	19.8	20.3	18.6	20.7
April .....	.103	.127	.113	.135	.125	26.5	21.3	25.1	19.9	23.2
May .....	.103	.120	.113	.140	.124	23.4	22.7	23.6	18.0	21.9
June .....	.084	.119	.111	.109	.113	20.3	24.5	11.7*	7.9	16.1
July .....	.062	.071	.091	.070	.077	9.3	10.2	7.7	6.9	9.0
August .....	.068	.084	.099	.082	.088	8.9	9.4	8.6	6.3	8.3
September .....	.070	.094	.117	.098	.103	9.5	13.9	8.5	9.2	10.3
October .....	.070	.103	.094	.102	.100	16.0	13.7	9.7	13.2	18.1
November .....	.070	.095	.120	—	.107	18.4	18.8	13.3	—	16.8
December .....	.075	.085	.111	—	.098	15.7	17.9	15.4	—	16.3

* From this month the Register Thermometer stood in a new house much less exposed than before;—the ranges are consequently much smaller.

TABLE II. Monthly Deviations.

Month.	Barometer at 32°.					Thermometer (mean of extremes.)				
	1823.	1824.	1825.	1826.	Mean.	1823.	1824.	1825.	1826.	Mean.
January	+.285	+.299	+.277	+.232	+.273	-16.7	-18.0	-17.0	-16.5	-17.0
February	+.233	+.165	+.184	+.119	+.175	-10.7	-11.5	-13.1	-10.9	-11.5
March	+.095	+.106	+.124	+.104	+.107	+ 0.5	- 1.3	- 4.3	- 0.9	- 1.5
April	-.083	-.016	-.027	-.048	-.043	+11.2	+ 6.9	+ 9.5	+10.3	+ 9.5
May	-.137	-.192	-.104	-.113	-.136	+12.7	+14.8	+15.5	+12.7	+13.9
June	-.307	-.304	-.278	-.267	-.289	+15.7	+11.9	+13.4	+11.5	+13.1
July	-.311	-.327	-.277	-.318	-.308	+ 6.1	+ 7.8	+ 7.6	+ 6.1	+ 6.9
August	-.227	-.242	-.168	-.175	-.203	+ 5.0	+ 7.8	+ 7.9	+ 5.1	+ 6.4
September	-.130	-.041	-.108	-.111	-.098	+ 4.5	+ 6.9	+ 5.6	+ 6.3	+ 5.8
October	+.084	+.066	+.036	+.099	+.074	- 0.1	+ 1.6	+ 1.4	+ 2.5	+ 1.3
November	+.169	+.201	+.175	—	+.181	-11.3	- 8.5	- 9.2	—	- 9.7
December	+.309	+.290	+.240	—	+.279	-17.0	-18.5	-17.4	—	-17.6

Mean Barometric Alt. 29°.468.

Mean Thermometric Alt. 77°.81.